

their fullest development in the tropics, and, from a scientific point of view, are among the most interesting as well as one of the largest of the groups of lower plants.

INSECTS AND THEIR ENEMIES.

The following incidents are taken from notes made during the last three years in Sarawak.

(i) *Insect Enemies.*

June 8th, 1910. Dayak collector reported having taken two beetles together in his net at one sweep; they were *Stigmatium granulatum*, Westwood (Fam. Cleridae) and a small Longicorn, *Demonax ventralis*, Gahan, or sp. nr. He stated that he saw the Clerid on a log and on catching it in his net, found the Longicorn in the mouth of the Clerid, still alive and kicking, but that the head dropped off as he boxed them. They were both brought to me in one pill-box and next day I went to identify them, but found that the Longicorn had been still further dismembered and eaten, so that identification of that specimen was not quite certain.

January 25th, 1911. A large Dipteron, *Laphria horrida*, Walker, was brought in by a native collector together with its prey (dead) a Eucnemid beetle (*Galba* sp. near *wallacei*, Perroud).

(ii) *Reptile Enemies.*

July 7th, 1910. Stomach of a lizard, *Mabuia rudis*, Blgr., contained a large hairy spider, the head of an Anthribid beetle (*Xenocerus*)? sp., a small cockroach and a large Hymenopteron.

November, 1911. A Danaine butterfly *Danaï's aspasia*, Fab., noticed on wall of house with wings spread out attached to spider's web; untouched for about three weeks, although lizards are frequently running over that wall after moths and other insects.

(iii) *Bird Enemies.*

November 30th, 1911. Stomach of the Dusky Broad-bill, *Corydon sumatranus*, Raffles, contained a large green* Phasmid, armed with spiny thorax (*Aruanoidea*

* Green in life, faded to dark grey-brown on examination.

gargantua, Westwood), much mangled or partially digested. Also a specimen in good condition of the Reduviid bug (*Astinum m-album*, A. and S., or sp. near).

February, 1910. Stomach of a Drongo, *Dissemurus paradiseus*, Linn., contained an Elaterid beetle very like (if not identical with) *Diploconus hebetatus*, Cand.

August, 1909. Stomach of Eastern Roller, *Eurystomus orientalis*, Linn., contained remains of a Brenthid, ? *Baryrrhincius dehiscens*, Gyll. A second example shot the same day contained the same.

November, 1911. Stomach of Paradise Fly-catcher (*Tersiphone affinis*, Hay), contained half digested remains of a Cicada (*Purana pryeri*, Dist. male).

(iv) *Mammal Enemies.*

May 16th, 1910. A monkey (*Macacus cynomolgus*, or "kra" as it is known to the natives here) was given a full grown larva of the Death's-head Moth (*Acherontia lachesis*, Fab.) which it ate with evident relish. I placed the caterpillar on the ground and held the monkey for a moment to let it see the caterpillar crawl about; on release the monkey at once seized it and began eating at the tail end. Then the caterpillar apparently nipped its hand slightly as the monkey suddenly went on to the head and soon devoured the whole thing, evidently enjoying it. The caterpillar was well chewed and swallowed, not temporarily deposited in the laryngeal pouch.

June, 1909. Noticed a large green Locustid on a shrub in the early morning and admired the beautiful way in which its green colouring rendered it so nearly indistinguishable from its surroundings. Brought the monkey out on my shoulder towards the bush; the monkey noticed the insect immediately, far quicker than I did, and quickly seized and devoured it with apparent pleasure, discarding the spiny legs.

July 26th, 1909. From a glass-bottomed pill-box, I gave a dull-coloured geometrid moth to the same monkey; eaten at once. Followed this by a Pierine, the yellow *Terias hecabe*, which she was allowed to look at first through the glass. After she had evinced obvious signs of curiosity and desire for it, the box was opened and the butterfly seized. At one bite she

demolished the head, body, and a good part of the wings. I immediately showed her another for which she seemed to express the same eagerness. On opening the box, she snatched it out hurriedly as before, but this time pulled off the wings first and ate the head and body only. The yellow scales from the wings seemed distasteful to her, though I think this was probably due to their "dusty" or "powdery" nature rather than to any unpleasant taste.

A gaudy Nymphaline (*Cethosia hypsea*, Doubl. and Hew.), was also given to her and eaten, after taking off the wings which she left altogether.

Another monkey (*Macacus nemestrinus* or "brok") ate a purple Euplœa (*E. mulciber*, Cr.), and two of the dull-coloured Geometers (name not noted), all three with an expressionless (to me) countenance. Perhaps looked a little thoughtful over the Euplœa.

On different occasions I have given Syntomid moths to the "brok." The black and yellow species, *S. tetragonaria*, Walker, she never seemed to enjoy, but usually consumed it rather under protest, and on two occasions rejected this species after tasting. The black and white species, *Trichaeta divisura*, Walker, and *Syntomis eliza*, Butler, were eaten slowly. The Arctiid, *Cretonotus vacillans*, Walker, was nearly always rejected by both monkeys, sometimes after tasting and on other occasions after a mere look at it.

According to certain theories, many insects are gaudily coloured so as to warn would-be enemies of certain distasteful properties possessed by them, and it is further supposed that these "warning" colours are recognised by the majority of insect-eating birds and reptiles, so that those insects which are so coloured, on the whole escape death in this manner, and only fall victims to the young and inexperienced individuals among their enemies, and perhaps in times of stress to certain very hungry individuals. The evidence supplied by examining contents of birds' stomachs and those of reptiles (particularly of lizards), is naturally of great value for supporting or refuting this theory. And if anyone in Sarawak when shooting insect-eating birds would cut out the stomach and send it whole or its contents only, preserved in spirit to the Museum, much valuable evidence could be gradually accumulated.